

IBM

Federal Systems Division
Gaithersburg, Maryland

Federal
Systems
Division

Scope of Avionics

IBM

Engineers and Scientists of the IBM Electronics Systems Center in Owego, New York, have successfully met the challenges of aerospace and avionics requirements for more than fourteen years.

During this relatively short period, avionics has matured as an art until now it rivals engines and airframes as vital elements of modern aircraft. Inherent in this maturing was an increase in complexity that matched the increased requirements of tactical, strategic, and special-mission aircraft.

This complexity has, in turn, required a new approach to Avionics, the systems approach. Because of complex inter-relationships between requirements, equipment and crew, Avionics now must be viewed as a total system instead of a series of related electronics requirements. Even a major subsystem cannot be designed without complete understanding of its role in the system — how it relates, how the crew uses it. Know-how like this does not come quickly. It takes years of experience working with the Air Force to understand the problems of flight. It requires continuous investigation of new technologies and methods.

IBM has Avionics experience dating back to 1951 when it became prime contractor and systems manager for the AN/ASQ-38 Bombing-Navigation System for the B-52. This aircraft still represents a powerful weapon in our nation's arsenal of defense. Over one-quarter of a million units have been supplied by IBM for the B-52. The capability of the B-52 was enhanced when IBM designed and built a terrain avoidance system for the aircraft — the first known operational system.

The success of the B-52 system led IBM into the XB-70 program. A team of engineers at the Owego Center attacked the problems of building a full size digital computer and console, as well as integrating the total bombing-navigation and missile guidance system for the aircraft. They successfully flight tested the system in December 1962 — the first full scale digital computer ever designed specifically for airborne use.

Currently, engineers at IBM's Electronics Systems Center are building and studying Avionics systems and subsystems for tomorrow's aircraft. They are:

- Studying Avionic requirements for the Advanced Manned Strategic Aircraft under contract to the U. S. Air Force Advanced Systems Division.
- Defining a target finding system for the Interim ARM missile — prior study of ways to locate and range on radiating sources prepared ESC for this responsibility. A twin-horn microwave anechoic chamber, the only one in this country, permitted IBM engineers to study ways to sort and identify two RF signals at one time. Also, using a re-programmed Gemini computer and displays, receivers, processors, and antennas, IBM engineers built and flight-tested a passive acquisition and surveillance system aboard an A4E aircraft early in 1966.
- Studying avionic requirements for an Airborne Warning and Control System — this large-scale airborne control system with a crew of 20-men and 25-tons of electronic equipment requires a complex trade-off study to make sure all elements operate together efficiently. Key areas of IBM's study include command and control techniques, communications, crew-equipment relationship, data processing, systems integration, and air traffic control.
- Investigating computer requirements for tactical aircraft such as the F-111.
- Developing new kinds of displays using solid state materials.
- Testing digital radar processing equipment.
- Building lasers for communications and radar.
- Developing sensors using new materials such as Mercury Cadmium Telluride.
- Building rugged computers for hardened environments using integrated circuits.

Past Electronics Systems Center Programs:

- B-52 Bomb-Nav Terrain Avoidance.
- XB-70 Bomb-Nav Terrain Avoidance.
- Titan II Guidance Computer.
- Titan III Guidance Computer.
- Saturn I Guidance Computer.
- Saturn IB/V Guidance Computer.
- Gemini Guidance Computer.
- Orbiting Astronomical Observatory Data Processor.